

Indicators and Endpoints - Making the Connection

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Ecological Risk Assessment

EPA Region 7

Indicators and Endpoints

- Part I - The ecological environmental indicator and how it relates to the ecological risk assessment process.
- Part II - A next step in the use of ecological “indicators” at CERCLA and RCRA sites.

The Ecological Environmental Indicator

- Strategy for monitoring the progress of interim and final remedies toward protecting the environment.
- Mechanism to track corrective action activities that protect ecological habitats and receptors at CERCLA and RCRA sites.
- Used to assess progress in evaluating risk, selecting remedies, and tracking remediation, as well as quantifying the amount of environmental media remediated.

The Ecological Environmental Indicator

- Requires the completion of an ecological risk assessment in order to document whether remediation goals are needed or a no further action determination is justified.
- This is a GOOD THING!

The Environmental Ecological Indicator

Contaminated media requiring a remedy to address ecological risk are broken out into the following categories:

- Upland Soils
- Stream bank/shoreline
- Sensitive environments
- Surface water
- Sediments

The Ecological Indicator

- The total amount of media requiring remediation in each of the categories is recorded as acres/volume
- For example, 200 cubic yards of upland soil or 10 acres of wetlands.

Part II

Endpoints - Taking the ecological
indicator to the next level

If the goal of the Ecological Risk Assessment is to determine clean-up levels that are protective of assessment endpoints, then does the completion of the remediation of unacceptable ecological risk according to the Ecological Environmental Indicator achieve that goal?

The answer should be.....

YES

But first - a few definitions!

- Indicator - A sign, symptom, index, or gauge.....(Merriam Webster Dictionary).
- Environmental Indicator - Measure used to track changes in the quality of the environment.

What is the ecological environmental indicator actually measuring?

- Monitor - Progress
- Track - Activities
- Assess - Risk
- Track - Remediation
- Quantify - Media remediated

Use the Endpoints!

- Assessment endpoints are a critical element of every ecological risk assessment, they are the “explicit expression of the environmental value that is to be protected.” The measurement endpoint is a measurable biological response that can be related to the assessment endpoint.

Based on these definitions, the measurement endpoint is an indicator because it allows for inferences about potential changes in the assessment endpoint.

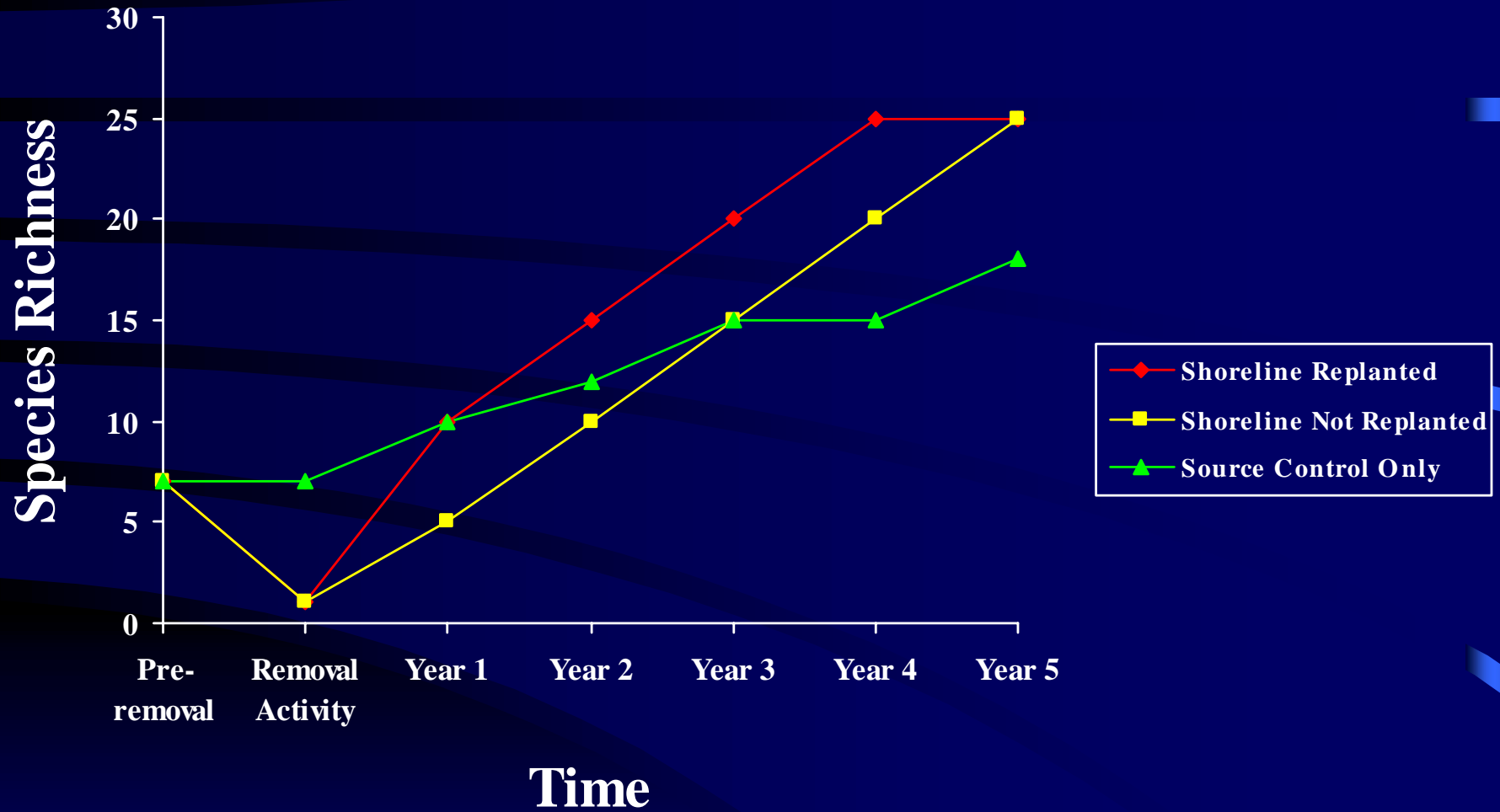
PAHs in Sediment - Example

- Assessment Endpoint - Survival, growth and reproduction of benthic invertebrates.
- Measurement Endpoint - Benthic invertebrate species richness associated with contaminated sediments.

Sediment Example:

- Ecological Environmental Indicator - Removal of 1 acre of contaminated sediment has been completed. The site has been successfully remediated for ecological risk according to the the Environmental Indicator.
- Measurement Endpoint - Annual monitoring of the benthic community to measure true ecosystem recovery over time.

Benthic Community Recovery Over Time Hypothetical Response Curve



Going Beyond the Ecological Environmental Indicator

- It is often possible to demonstrate the effectiveness of remediations to reduce ecological risks.
- Once the remediation is complete, monitoring can be a useful tool in determining the effectiveness of the remediation.
- The original measurement endpoints are useful ecological indicators in monitoring efforts.